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OF FUNGUS GNATS OF THE
FAMILY MYCETOPHILIDAE

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RELATIONSHIPS OF CERTAIN GENERA OF
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Amherst, Mass.

The present study represents a continuation of a preliminary investigation of the possible value of thoracic sclerites in determining the relationships of certain insects. Dr. G. C. Crampton was the first to demonstrate the use of these sclerites as a means of determining the systematic position of insects. In 1925, he published a classical study of the comparative morphology of the thorax of nontipuloid Nematocera. In 1948 Shaw presented a paper in which he indicated the value of thoracic sclerites as an aid in determining the phylogeny of the Mycetophilidae. Although the number of genera he studied was admittedly small, principles were developed that have been of value in distinguishing the phylogenetic relationships of certain genera.

Edwards (1925) was the first to indicate that the structure of thoracic sclerites might be of value in determining generic characters in this group. In his monograph of the British fungus gnats he noted that in certain genera the sclerites differed in form and that such differences might be of value in separating groups of these insects.

¹ We wish to express our thanks to the Society of Sigma Xi for a grant-in-aid that made possible the preparation of the illustrations for this paper. Also, in the progress of this research, several others have been of invaluable assistance. To Elmer Smith much credit is due for preparing the figures and for his keen interest and observations. To Dr. John Lane, of São Paulo, Brazil, we are indebted for specimens of certain genera and for helpful suggestions. Dr. E. G. Fisher offered pertinent suggestions relating to the phylogeny of the group. Dr. Paul Freeman, of the British Museum of Natural History, kindly lent certain specimens for examination.

Owing to the comparative scarcity of specimen material of some of the fungus gnats of this family, it was not possible in all cases to prepare specimens properly for morphological study. Consequently, no figures were made for the genera *Manota*, *Lygistorhina*, *Stenophragma*, *Platyroptilon*, and *Allactoneura*, but sufficient observations were made from pinned specimens in most instances to determine the generic affinities.

In Shaw's 1948 paper 21 mycetophilid genera were figured and discussed. He indicated the features that appeared primitive and using these as principles was able to indicate the relationships of the forms studied from a phylogenic standpoint.

Of the genera studied, 45 are figured herein. While thoracic sclerites are primarily used, in some cases venation and chaetotaxy are also considered. Representatives of all but two subfamilies, the *Lygistorhiniinae* and the *Manotinae*, are figured. On the basis of the present investigation, certain genera are no longer considered as distinct. In some instances the position of certain genera within tribes is questioned, and two new tribes are proposed. Certain genera formerly united to others are recognized as distinct on the basis of thoracic sclerites.

To aid the reader in visualizing the scope of the work the following table is presented. The position of the genera is indicated as they are placed as a result of these studies. Genera indicated by an asterisk are not figured but have been studied. A question mark indicates that the affinities of the genus are still somewhat uncertain.

<i>Subfamily</i>	<i>Tribe</i>	<i>Genera represented</i>
Bolitophilinae		<i>Bolitophila</i> Meigen (including <i>Bolitophilella</i> Landrock)
Ditomyiinae		<i>Centrocnemis</i> Phillipi ? <i>Nerviuncta</i> Marshall <i>Symmerus</i> Walker <i>Calliceratomyia</i> Lane <i>Diadocidia</i> Ruthe <i>Palacoplastyura</i> Meunier <i>Proceroplatus</i> Edwards <i>Ceroplatus</i> Bosc <i>Platyroptilon</i> Westwood * <i>Apemon</i> Johannsen ? <i>Platyura</i> Meigen <i>Macrocera</i> Meigen <i>Fenderomyia</i> Shaw
Diadocidinae		
Ceroplastinae (including Macrocerinae: genera <i>Macrocera</i> and <i>Fen- deromyia</i>)		<i>Mycomyia</i> Rondani <i>Eudicrana</i> Loew <i>Monoclona</i> Mik * <i>Neuratelia</i> Rondani <i>Parvicellula</i> Marshall <i>Phthinia</i> Winnertz <i>Polylepta</i> Winnertz <i>Sciophila</i> Winnertz <i>Stenophragma</i> Skuse * <i>Syntemma</i> Winnertz
Sciophilinae	Mycomyiini Sciophilini	

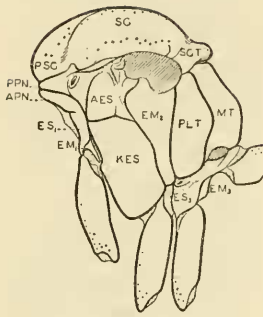
Subfamily	Tribe	Genera represented
Sciophilinae	Gnoristini	<i>Gnoriste</i> Meigen
		<i>Bolctina</i> Staeger
	Leiini	<i>Coelosia</i> Winnertz
		<i>Paratinia</i> Mik
		<i>Dziedzickia</i> Johannsen
		<i>Leia</i> Meigen
		<i>Tetragoneura</i> Winnertz
		<i>Ectrepesthoneura</i> Enderlein
		<i>Docosia</i> Winnertz
		<i>Anomalomyia</i> Hutton
Cycloneurini	<i>Cycloneura</i> Marshall	
Allactoneurini	<i>Procycloneura</i> Edwards	
Mycetophilinae	Exechini	<i>Allodia</i> Winnertz
		<i>Brachypeza</i> Winnertz
	Mycetophilini	<i>Exechia</i> Winnertz
		<i>Cordyla</i> Meigen
		<i>Epicyptha</i> Winnertz
		<i>Mycetophila</i> Meigen (including <i>Mycothera</i> Winnertz)
		<i>Opistholoba</i> Mik
		<i>Phronia</i> Winnertz
		<i>Sceptonia</i> Winnertz
		<i>Manota</i> Williston *
Manotinae	<i>Lygistorhina</i> Skuse *	
Lygistorhininae		
Family Sciaridae	<i>Sciara</i> Meigen	
	<i>Pseudosciara</i> Schiner	

Subfamily BOLITOPHILINAE

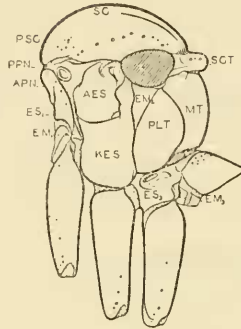
The subfamily Bolitophilinae is represented by the two genera *Bolitophila* (fig. 1) and *Bolitophilella* (fig. 2), which have been distinguished on the basis of the termination of R_4 of Edwards. In *Bolitophila* this vein ends in the costa, whereas in *Bolitophilella* it ends in R_{1+2} . The value of this character is somewhat open to question as far as its use to separate genera is concerned. From the thoracic sclerites, only minor differences are apparent. The episternum of the prothorax is more elongate in *Bolitophila* and the mesepimeron is slightly broader. However, the structures are so similar that we would not recognize the two genera as distinct.

Subfamily DITOMYIINAE

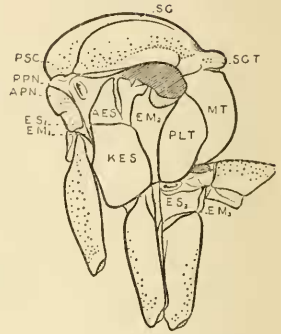
The subfamily Ditomyiinae is represented by *Centrocnenis* (fig. 5), *Symmerus* (fig. 3), and *Nervijuncta* (fig. 4). On the basis of thoracic



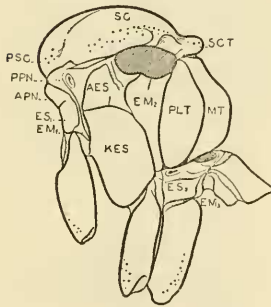
1. BOLITOPHILA



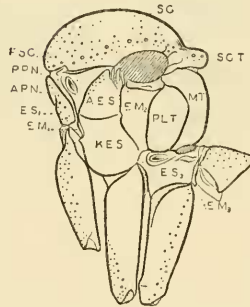
4. NERVIJUNCTA



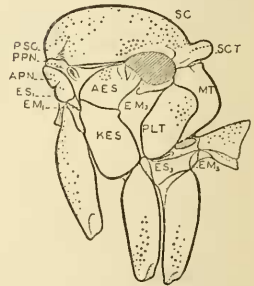
7. PALAEOPLATYURA



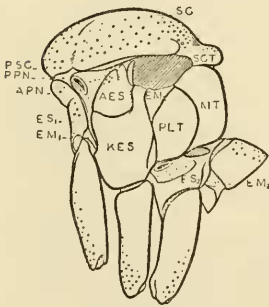
2. BOLITOPHILELLA



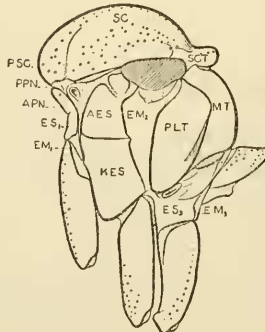
5. CENTROGNEMIS



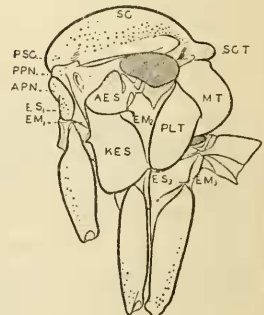
8. PROCCROPLATUS



3. SYMMERUS



6. DIADOCIDIA



9. GEROPLATUS

FIGS. 1-9.—Genera of the family Mycetophilidae.

sclerites *Symmerus* and *Nervijuncta* seem closely related. Both genera possess a dorsal projection from the katapisternum of the mesothorax. In reality this structure represents a fusion of the posterior portion of the anepisternite with the katapisternite. In *Symmerus* the mesepimeron is greatly reduced, with only the dorsal and ventral portions remaining. In *Nervijuncta* this reduction has gone even further, with only the dorsal portion remaining.

We have never seen a specimen of *Calliceratomyia* Lane, but through the courtesy of John Lane we have a sketch of the thorax of a specimen of this genus. Though lacking in certain details, the drawing clearly indicates that *Calliceratomyia*, on the basis of thoracic sclerites, is closely related to *Nervijuncta* and *Symmerus*.

We are uncertain whether the genus *Centrocnemis* is correctly placed in the Ditomyiinae. Unfortunately, we were not able to obtain specimens of *Ditomyia* for study. The only characteristic that *Centrocnemis*, *Symmerus*, and *Nervijuncta* show in common is the well-developed metapleura. Otherwise, from the standpoint of thoracic sclerites there is not much similarity. *Centrocnemis* possesses a well-developed and broad mesepimeron resembling that of *Apemon*. The dorsal lobe of the katapisternum, as found in both *Symmerus* and *Nervijuncta*, is lacking. From the standpoint of venation, *Centrocnemis* is more closely related to *Mycetobia* (Anisopodidae) than to *Symmerus* or *Nervijuncta*. Until the opportunity to study *Ditomyia* is presented we reserve judgment as to the ultimate systematic position of *Centrocnemis*.

Subfamily DIADOCIDINAE

The subfamily Diadocidinae is represented by the genus *Diadocidia* (fig. 6). The position of *Diadocidia* is not entirely clear. From the standpoint of venation, this genus must be considered as more highly evolved than either the Bolitophilinae or the Ceroplatinae. The radius is 2-branched and the stem of media is lacking. The affinities of *Diadocidia* seem to be closer to the Bolitophilinae than to the Ceroplatinae. Both *Bolitophila* and *Diadocidia* exhibit a remnant of a meron. In both genera the anepisternal cleft is not so pronounced as it is in *Palaeoplatyura*. The structure of the prothorax is similar for *Bolitophila* and *Diadocidia*.

Subfamily CEROPLATINAE

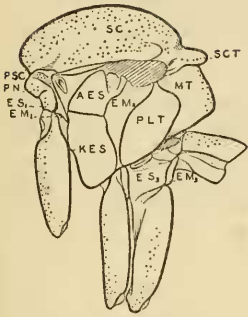
The Ceroplatinae figured represent the seven genera *Palaeoplatyura* (fig. 7), *Proceroplatus* (fig. 8), *Ceroplatus* (fig. 9), *Platyura* (fig.

10), *Apemon* (fig. 11), *Macrocera* (fig. 12), and *Fenderomyia* (fig. 13). In addition we have examined a specimen determined by Edwards as *Platyroptilon miersi* Westwood. This specimen lacked antennae; the pleurotergites were not hairy as Tonnoir (1929) states them to be in this genus; and there was no evidence of setae on the anepisternite. There may therefore be some question as to the correct identity of the insect. In any case the specimen we examined identified as *Platyroptilon* was very close to *Ceroplatus* on the basis of thoracic sclerites.

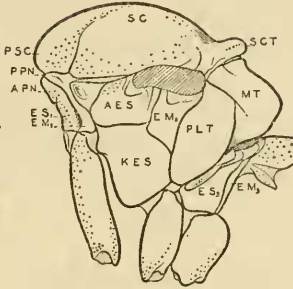
If *Apemon* be excluded, it is fairly simple to consider the other genera of the Ceroplatinae as having developed from a form similar to *Palaeoplatyura*. All exhibit the reduction of the mesepimeron and a dorsoventral compression of the thorax resulting in an apparent shifting of the sclerites posteriorly to a more nearly horizontal position. Such a shift becomes very prominent in certain genera of the Mycetophilini.

Apemon, as indicated in an earlier paper (Shaw, 1948), is somewhat of an anomaly. On the basis of thoracic sclerites its affinities seem closer to *Centrocnemis*, *Symmerus*, and *Nervijuncta* of the Ditomyiinae. As in *Centrocnemis*, the mesepimeron is broad. The cleft in the anepisternite is very distinct and indicates what has probably happened in both *Symmerus* and *Nervijuncta* where the katepisternite seems to have a dorsal lobe extending to the wing basis. On the basis of thoracic sclerites *Apemon* occupies an intermediate position between the Ditomyiinae and Ceroplatinae; from the standpoint of venation it seems to be intermediate between *Palaeoplatyura* and *Platyura*. As in *Palaeoplatyura* the stem of media is distinct. However, as in *Platyura* the r-m cross vein is lost, apparently through the fusion of a portion of the stem of media with Rs. *Apemon* also exhibits the dorsoventral flattening of the thorax as also found in *Proceroplatus* and *Platyura*.

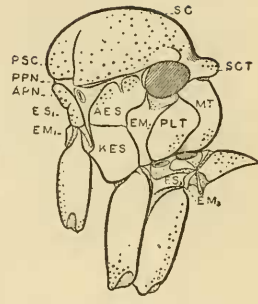
The systematic position of the Macrocerinae has been somewhat in question. Some workers, including Lane and Coher, consider this subfamily inseparable from the Ceroplatinae. We have two representatives of the Macrocerinae, *Macrocera* (fig. 12) and *Fenderomyia* (fig. 13). *Macrocera* on the basis of thoracic sclerites is intermediate between *Palaeoplatyura* and *Platyura*. However, in *Palaeoplatyura*, *Ceroplatus*, and *Platyura* there is a rather indistinct indication of a meron in the mesothoracic leg. This is lacking in *Macrocera*, *Fenderomyia*, and also in *Proceroplatus*. *Macrocera*, *Proceroplatus*, *Platyura*, and *Ceroplatus* all exhibit one characteristic in common—the reduction of the lower portion of the epimeron of the mesothorax. This



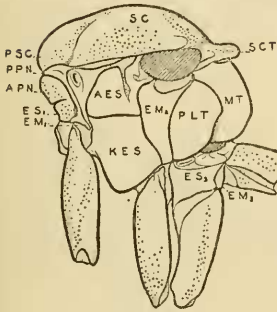
10. PLATYURA



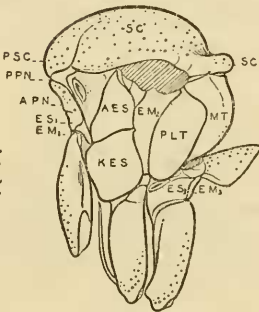
13 FENDEROMYIA



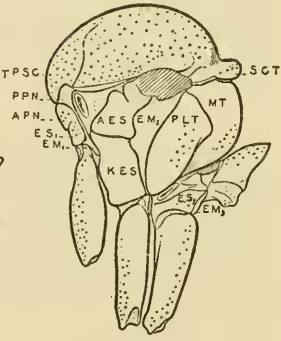
16. PARVICELLULA



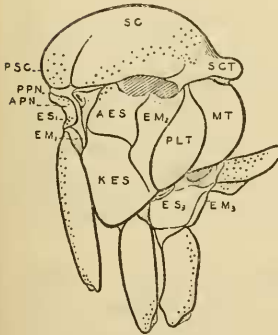
11. APEMON



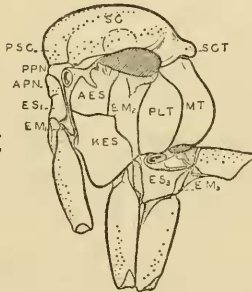
14. MYCOMYIA



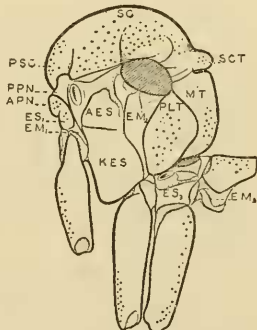
17. POLYLEPTA



12. MACROCERA



15. PARATINIA



18. NEURATELIA

FIGS. 10-18.—Genera of the family Mycetophilidae.

culminates in the condition shown in *Fenderomyia* where the pleurotergite and the katapisternite touch each other, obliterating practically all the lower half of the epimeron but the tip. *Ceroptatus*, *Proceroptatus*, *Platyura*, and *Fenderomyia* also possess another characteristic in common—the mediotergite instead of being rounded, as in *Palaeoplatyura* and *Macrocera*, becomes distinctly angulated. This might result from a dorsoventral flattening of the thorax and is also indicated in the position of the pleurotergies, which shift to a more horizontal position. Our present opinion would be that the Macrocerinae should be included in the Ceroptatinae.

Subfamily SCIOPHILINAE

The Sciophilinae are represented by six tribes: The Mycomyiini, the Sciophilini, the Gnoristini, the Leini, the Cycloneurini, and the Allactoneurini.

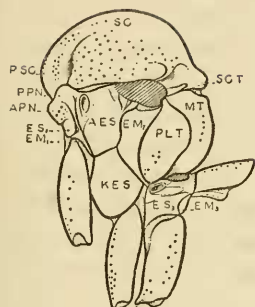
Tribe MYCOMYIINI

The Mycomyiini are represented only by the genus *Mycomyia* (fig. 14). Shaw (1948) indicated that *Mycomyia* might be an annectant form between the Sciophilinae and the Mycetophilinae. Such a belief is based on the structure of the pleura, and also, as pointed out by Fisher, the male hypopygium indicates such a relationship.

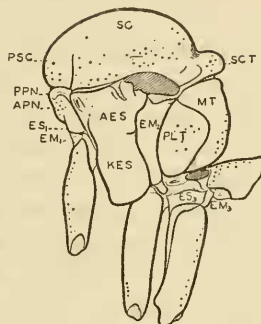
Tribe SCIOPHILINI

Edwards (1925) states that the possession of macrotrichia on the wing membrane is diagnostic of the tribe. The value of this character for generic recognition may be open to question. He adds that where the microtrichia have disappeared it may not always be easy to determine which set of hairs is present. Another characteristic of value in delimiting this group is the possession of some hairs or bristles on the postnotum (mediotergite). This characteristic is not common to all genera.

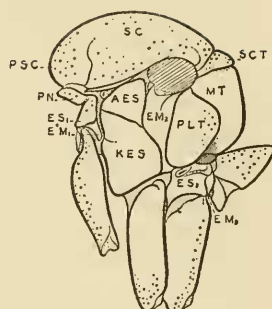
The Sciophilini figured in this study include eight genera—*Eudicrana* (fig. 21), *Neuratelia* (fig. 18), *Paratinia* (fig. 15), *Parvicellula* (fig. 16), *Phthinia* (fig. 19), *Polylepta* (fig. 17), *Sciophila* (fig. 22), and *Syntenna* (fig. 20). *Monoclona* was examined but not figured. Of the species studied, all but *Paratinia*, *Syntenna*, and *Monoclona* have hairs or setae on the mediotergite. All but *Paratinia* have setae on the pleurotergites. Concerning the latter genus, Edwards (1925) states: "It does not seem to be very closely related to the other genera of the Sciophilini but I include it here on account of macrotrichia on



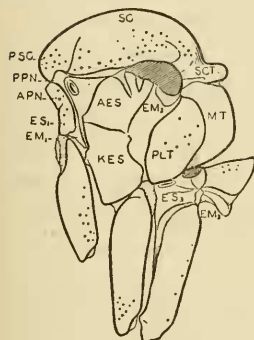
19. PHTHINIA



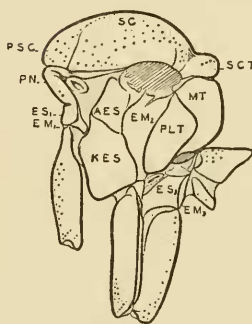
22. SCIOPHILA



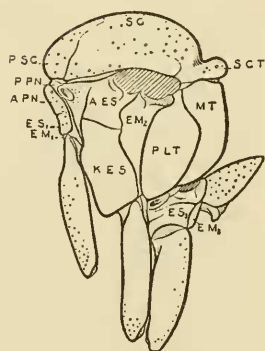
25. DZIEDZICKIA



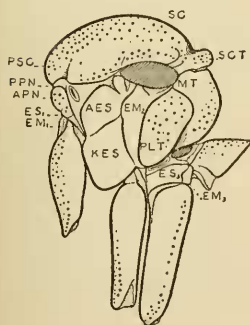
20. SYNTEMNA



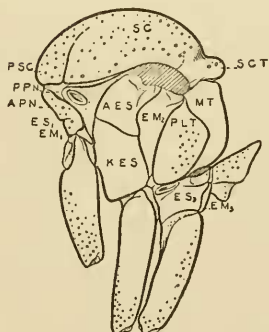
23. GNORISTE



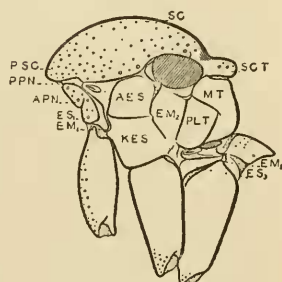
26. COELOSIA



21. EUDICRANA



24. BOLETINA



27. CYCLONEURA

FIGS. 19-27.—Genera of the family Mycetophilidae.

the apical half of the wing and the elongate abdomen with large seventh segment. It may be related to *Phthinia* and in some respects appears intermediate between that genus and *Speolepta*."

On the basis of the thoracic sclerites we see no evidence to support such a belief. The structure of epimeron, the indication of fusion of the posterior part of the anepisternite with the epimeron, and the absence of setae on both mediotergites and pleurotergites indicate that the affinities of the genus are closer to those of certain of the Gnoristini than to the Sciophilini. If the possession of macrotrichia is considered as the important characteristic, then *Paratinia* must be included with the Sciophilini. If so placed it would be closer to *Parvicellula* than to other members studied. Possibly too much value has been placed on the presence or absence of macrotrichia on the wing in the past. The genus *Parvicellula*, according to Tonnoir and Edwards (1926), is peculiar to New Zealand. In venation it most closely resembles *Monoclona*. On the basis of the shape of the anepisternite, *Monoclona* resembles *Mycomyia*. In fact, *Parvicellula*, *Monoclona*, and *Mycomyia* seem fairly closely related on the basis of thoracic sclerites. *Parvicellula* is not too closely allied to other members of the Sciophilini on the basis of thoracic sclerites. The anepisternite and katepisternite are more nearly equal in size in *Parvicellula*, and in this respect the genus is more closely related to *Phthinia* than to the other genera of this tribe represented in this study. The shape of the mesepimeron differs in both genera. The course of the dorsal half of the mesopleural suture in *Parvicellula* may indicate that the posterior part of the anepisternite may be fused with the epimeron at times. If the pleural suture were to extend in a straight line dorsally from the juncture of the anepisternite and the katepisternite, then the epimeron would have the structure as shown in *Paratinia*. The indication is that the posterior portion of the anepisternite may be fused with either the mesokatepisternite or the mesepimeron. The genus *Polylepta*, as indicated by Shaw (1948), has thoracic sclerites resembling those of *Platyura* except that the dorsoventral flattening, as indicated in *Platyura*, is not so marked in *Polylepta*. The possession of setae on the anepisternite, pleurotergite, and mediotergite is possibly evidence that *Parvicellula* and *Polylepta* are related.

The structure of the mesepimeron indicates that *Polylepta* and *Tetragoneura* (Lciini) were related. This may be only a superficial resemblance. *Tetragoneura* does not possess setae on the anepisternite, the pleurotergite, or the mediotergite. In the wing venation *Polylepta* and *Neuratelia* are very similar except for loss of vein R_4 (Edwards) in *Neuratelia*. From the standpoint of thoracic sclerites the arching of

the posterior pronotum is common to both genera. In *Neuratelia* the posterior portion of the anepisternite seems to be in the process of fusing with the epimeron.

Phthinia resembles in some ways *Polylepta*. Like *Polylepta* it has setae on the mediotergite and pleurotergites. The anepisternites in both genera have fine hairs. *Phthinia* shows evidence of specialization in venation and also in the subequal anepisternite and katapisternite of the mesothorax. Edwards (1925) has indicated that *Phthinia* may be related to *Speolepta*. However, the latter genus lacks setae on the mediotergite and on the pleuroterga. Since we do not have material to study the sclerites of *Speolepta*, we cannot state whether these structures affirm Edwards' beliefs.

The genus *Syntemma* seems to be somewhat closely related to *Neuratelia* and *Polylepta* on the basis of thoracic sclerites. The epimeron of *Polylepta* might result from the fusion of a part of the posterior lobe of the anepisternite with the mesepimeron. The venation of *Syntemma* does not appear especially close to that of either of these genera. Edwards (1925) has indicated that *Syntemma* may be more closely related to the Gnoristini, apparently considering that *Dziedzickia* and this genus were similar. The thoracic sclerites do not indicate too close a relationship. The prothorax of *Dziedzickia* is greatly modified. Apparently the posterior lobe of the anepisternite has fused with the mesepimeron in *Dziedzickia*. This would indicate that the latter genus was more specialized than *Syntemma*. This view is not supported by venation. Edwards' inclusion of certain species of *Syntemma* in *Dziedzickia* on the absence of macrotrichia on the wing might be questionable unless supported by other characteristics.

The genus *Sciophila* seems to be the most specialized of the genera studied in this tribe. While it has maintained a relatively broad mesepimeron, the suture between the anepisternite and katapisternite of the mesothorax is almost lost. This condition is found also in the genus *Anomalomyia* (Leini). Moreover, there is a reduction in the size of the epimeron of the prothorax.

The genus *Stenophragma*, represented by *Stenophragma nigricauda* Edwards, on the basis of thoracic structures seems very closely allied to *Sciophila*.

On the basis of venation *Monoclona* is close to *Sciophila* except for the unbranched cubitus and poor development of anal veins. Edwards (1925) indicated that the macrotrichia of the wing are reflexed in *Monoclona* and not decumbent as in *Sciophila*. The thoracic sclerites do not indicate a close relationship of the two genera. The anepister-

nite of *Monoclona* resembles that of *Mycomyia* more closely than it does that of *Sciophila*.

The genus *Eudicrana* is closely related to *Sciophila*. The suture between the mesothoracic anepisternite and katepisternite is beginning to disappear. The prothoracic epimeron shows a reduction in its width. From the standpoint of venation, *Eudicrana* seems more primitive. Only in the absence of the median ocellus is *Eudicrana* more specialized than *Sciophila*.

Tribe GNORISTINI

The tribe Gnoristini is represented by four genera—*Boletina* (fig. 24), *Coelosia* (fig. 26), *Dziedzickia* (fig. 25), and *Gnoriste* (fig. 23). On the structure of the thoracic sclerites the group appears to be quite homogeneous. All possess an epimeron that is broad dorsally and narrowed ventrally. *Gnoriste* seems to be most primitive on the basis of the structure of the epimeron. However, *Gnoriste* shows evidence of specialization in the possession of an elongate proboscis.

We believe that in all this group the posterior part of the anepisternite of the mesothorax is in the process of being fused or has been fused with the mesepimeron. This condition is most marked in *Dziedzickia*.

Boletina and *Dziedzickia* differ from *Gnoriste* and *Coelosia* in the possession of setae on pleurotergites. In regard to *Coelosia*, Edwards (1925) removed *Phthinia thoracia* Winnertz and *P. curta* Johannsen to this genus. Only future examination of specimens of these will determine if the thoracic sclerites indicate the validity of this grouping. Another feature shared in common by the four genera studied is the position of a suture between the anepisternite and katepisternite of the mesothorax. This suture does not extend in a horizontal line, as in many genera, but dips posteriorly. Both *Gnoriste* and *Boletina* show a reduction in the size of the propleura. They also exhibit a tendency for the pronotum to be compressed and eventually to assume an almost horizontal position, as shown in *Dziedzickia*.

The venation of the genera studied varies considerably. Thus *Dziedzickia* is the only one of the genera studied that possesses the upper branch of the radial sector (R_4 of Edwards); in other respects the venation resembles that of *Syntemna* of the Sciophilini. *Boletina* and *Gnoriste* have a similar venation. *Coelosia* resembles the genus *Phthinia* of the Sciophilini, differing primarily in the loss of Sc_2 .

Johannsen (1911) has noted that certain species of *Boletina*, *Coelosia*, and *Gnoriste* share the peculiarity of having one claw of each foot of the male modified.

Tribe LEIINI

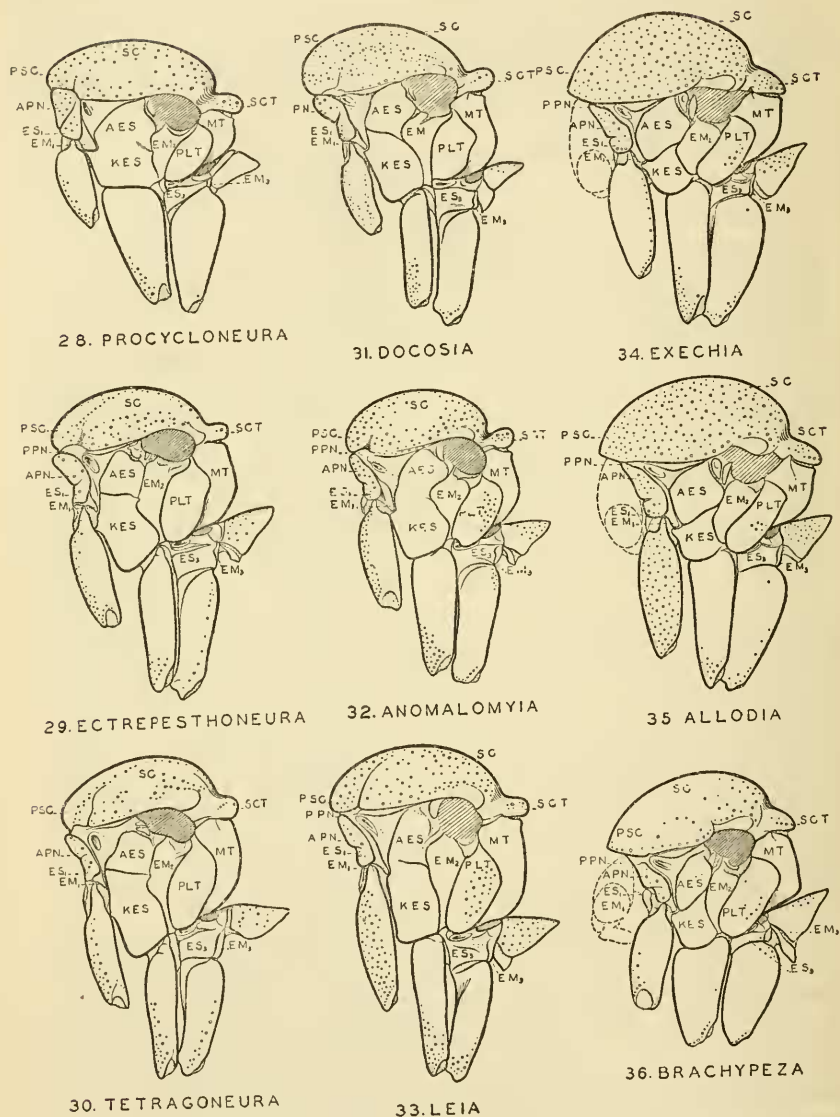
The tribe Leiini is represented by the genera *Leia* (fig. 33), *Tetragoneura* (fig. 30), *Ectrepesthoneura* (fig. 29), *Docosia* (fig. 31), *Anomalomyia* (fig. 32). The genera *Cycloneura* and *Procycloneura*, formerly placed in the Leiini, are considered to represent a distinct tribe, the Cycloneurini.

All these genera lack setae on the mediotergite. *Leia* and *Anomalomyia* possess setae on the pleurotergites. *Procycloneura* and *Anomalomyia* have lost the suture separating the mesothoracic anepisternite from the katepisternite. The condition has been noted already in *Sciophila* (Sciophilini). The significance of some of these apparent relationships may be open to question.

Ectrepesthoneura and *Tetragoneura* are closely related. Some slight differences in the shape of the pronotum, the mesothoracic katepisterna, and epimera. These are probably of sufficient importance to justify the maintaining of the two genera as distinct. The two genera differ in venation: *Tetragoneura* has Sc short and ending free and Cu forking near the middle of the wing; *Ectrepesthoneura* has Sc longer, ending in R, and Cu forking near the base of the wing. Edwards (1925) calls attention to the forking of the cubitus near the wing base, supporting the conclusion that this group of genera are more or less related to the Sciarinae. On the basis of thoracic sclerites, the similarity between *Tetragoneura* and *Ectrepesthoneura* is not so evident as would be indicated from the venation. *Docosia*, on the basis of thoracic sclerites, more closely resembles the Sciaridae. However, the resemblance is more or less superficial. *Sciara* possesses a midpleural pit, the division of the pronotum into an anterior and a posterior division, and a precoxal bridge. All these characteristics are lacking in *Docosia*. *Docosia*, on the basis of thoracic structures, is not closely related to either *Leia* or *Anomalomyia*.

Edwards (1925) pointed out that *Docosia* in life much resembles *Sciara*. He adds that *Docosia* also resembles *Tetragoneura* in appearance and habits and concludes that the genus is not distantly related to *Tetragoneura*. The shape of the epimeron, the pleurotergite, and the course of its suture separating the mesothoracic anepisternite from the katepisternite do not support the close relationship of *Tetragoneura* and *Docosia*. The absence of pleurotergal setae is common to *Docosia*, *Ectrepesthoneura*, and *Tetragoneura*.

Anomalomyia, on the basis of venation, resembles rather closely *Rondaniella*. It would not be too difficult to derive the shape of the thoracic sclerites as found in *Anomalomyia* from those of *Leia*. If



Figs. 28-36.—Genera of the family Mycetophilidae.

the posterior lobe of the anepisternite were fused with the epimeron as somewhat indicated in *Lcia*, and if the suture between the anepisternite and the katepisternite were completely lost, the two thoraces would be quite similar. There are indications of loss of the suture between the anepisternite and the katepisternite in *Lcia*.

Cycloneura and *Procycloneura* might be placed in a tribe by themselves. Their inclusion in the Leiini seems questionable to us. In some respects they seem closer to the Mycetophilinae. Both have Sc short ending free. *Procycloneura* has the lateral ocelli touching the eye margin. They lack setae on the anepisternites, the pteropleurites, the pleurotergites, and the mediotergites. However, there is some variation in the distribution of setae in the representatives of the Mycetophilinae studied. The coxae appear stouter and more compact as in *Sceptonia* or *Epicypa* (Mycetophilinae). Until more material is made available for study it may be well to maintain *Cycloneura* and *Procycloneura* in the Sciophilinae. We do consider it valid to designate a new tribe—the Cycloneurini—which we establish here for these two genera and characterize as follows:

CYCLONEURINI, new tribe

Wing venation of the same general type as in *Lcia*. Some species of *Cycloneura* with a fusion of Cu_2 and the anal vein, resulting in the formation of a closed cell. Thorax showing dorsoventral depression. Coxae stout and compact. Metapleura reduced in size.

In those forms possessing a suture between the anepisternite and the katepisternite, the thoracic sclerites are subequal in size. In this respect, the two genera placed in the Cycloneurini differ from the Leiini studied, which have the katepisterna larger than the anepisterna. We would expect *Paracycloneura* to fall in this tribe, but not having seen specimens we cannot definitely place it here.

Of the two genera, *Cycloneura*, on the basis of thoracic sclerites, appears the more primitive. The suture between the anepisternite and the katepisternite of the mesothorax persists but is lost in *Procycloneura*. Also the dorsoventral compression of the thorax is more marked in the latter genus.

ALLACTONEURINI, new tribe

A specimen of *Allactoneura argentosquamosa* Enderlein, determined by Edwards, was made available for examination by Dr. Freeman. Edwards (1925) erected a new subfamily, the Manotinae, to

include this genus and *Manota*. An examination of thoracic sclerites indicates that *Allactoneura* is very similar to *Procydoneura*. The prothoracic region is more modified, being more dorsally produced. The pleurotergites are setose. The venation does not resemble either of the genera included thus far in the Cycloneurini. *Allactoneura* in our opinion is not closely allied to *Manota* but is more closely related to the Cycloneurini. It does not seem to agree with the Cycloneurini in venation or in chaetotaxy. Edwards (1925) called attention to the shape of the head of this genus, reminding one of the *Brachycera* and *Cyclorrhapa*, and also to the presence of scales on the thorax and abdomen. We consider it best to erect the above-named new tribe, the Allactoneurini, for this genus. It may be characterized as follows: Wing venation—Sc long, ending in costa, Sc₂ present. R 2-branched, M 2-branched. Cu 2-branched with fork at base of wing. Prothorax projecting dorsally into mesoscutum. Suture between anepisternite and katepisternite of mesothorax lost. Legs robust. Thorax and abdomen with scales. At present this tribe includes only one genus—*Allactoneura*.

Subfamily LYGISTORHININAE

This subfamily was proposed by Edwards for *Lygistorhina* Skuse, including *Probolaeus* Williston and *Palaeognoriste* Meunier. Johannsen (1911) included *Probolaeus* with the Mycetophilinae but stated, "It is possible that this genus should be placed with the Sciarinae." Although lacking proper material for a detailed study of the thorax, an examination of some slides indicates that the affinities of *Lygistorhina* are with those of the Sciophilinae, possibly being closest to the Gnoristini. However, the peculiar head structure, the elongate proboscis wholly unlike that of other mycetophilids, and the venation warrant the maintenance of a separate subfamily.

Subfamily MYCETOPHILINAE

The subfamily Mycetophilinae has been divided into two tribes on the following characteristics by Edwards (1925):

Anepisternal bristles present, hind coxa usually lacks a basal seta. .Mycetophilini
 Anepisternal and pteropleural bristles absent, hind coxa usually with a
 strong basal seta.....Exechini

Tribe EXECHINI

The Exechini are represented by *Allodia* (fig. 35), *Brachypeza* (fig. 36), and *Exechia* (fig. 34) in this study.

Exechia and *Allodia* are closely allied. They are separated by the position of the fork of Cu, which is beyond that of *media* in *Exechia* and before the medial fork in *Allodia*. On the basis of thoracic sclerites there are no significant differences between the two. This substantiates the view of Edwards (1925).

Brachypeza, on the basis of thoracic sclerites, is not too closely allied to either *Allodia* or *Exechia*. In fact, our material has a setose anepisternite and on this basis would not be placed in the Exechini. It possesses one strong and two weaker setae on the base of the hind coxa. Thus it possesses characters of both the Exechini and the Mycetophilini.

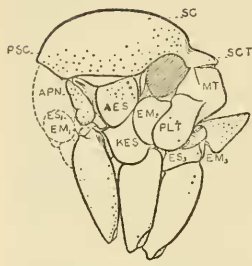
On the basis of venation *Brachypeza* appears closely related to *Rhymosia*. The anepisternite in some specimens of *Rhymosia* we have examined resembles more closely the anepisternite in *Brachypeza* than it does that of *Allodia*. This sclerite in *Brachypeza* is roughly hexagonal in shape, as in some of the species of *Rhymosia* we have examined. Possibly this may be of value in distinguishing between *Allodia* and *Rhymosia*. An investigation should be made of the two genera *Allodia* and *Rhymosia* to determine whether both are valid and also to reevaluate the systematic position of the species of the two genera.

Tribe MYCETOPHILINI

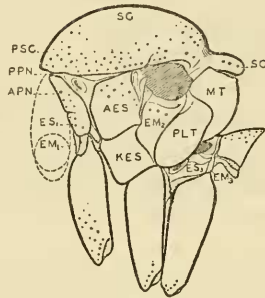
The tribe Mycetophilini is represented by *Cordyla* (fig. 37), *Epicypta* (fig. 42), *Mycetophila* (fig. 39), *Mycothera* (fig. 40), *Opisthobloba* (fig. 41), *Phronia* (fig. 38), and *Sceptonia* (fig. 43). There seems to be a logical division of these genera on the absence or presence of pteropleural (mesepimeral) setae. On this basis, *Dynatosoma*, *Cordyla*, *Trichonta*, and *Phronia* form one group and the remaining genera of the tribe Mycetophilini another. This division seems to be supported by the structure of the thoracic sclerites. We have not examined *Dynatosoma* as far as the thoracic sclerites are concerned. From the standpoint of venation, this genus seems close to *Trichonta*. In general appearance the genus resembles *Mycetophila* but lacks mesepimeral bristles.

Edwards (1925, p. 587) has figured the thorax of *Trichonta*. While somewhat lacking in detail, it indicates that *Phronia* and *Trichonta* are closely allied. Both have the anepisternite more or less hexagonal in shape; the structure of the epimera is very similar.

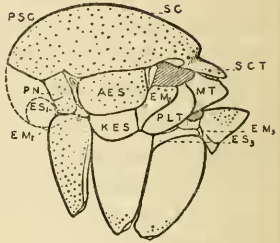
Cordyla seems to be the most specialized of this group. It shows more marked dorsoventral compression of the thorax. Evidence of specialization is also indicated by the enlarged second palpal segment



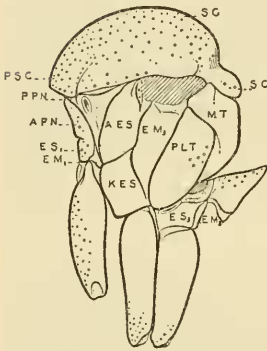
37 CORDYLA



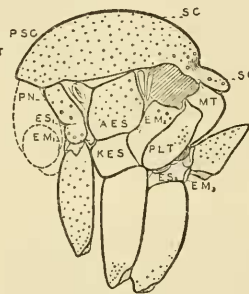
40. MYCOTHERA



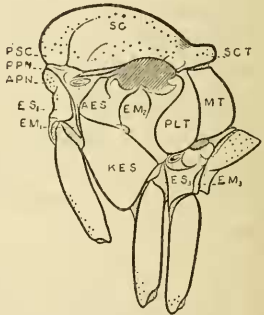
43. SCEPTONIA



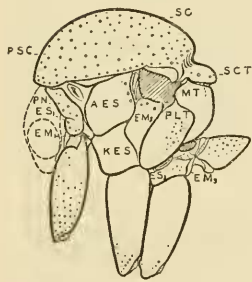
38. PHRONIA



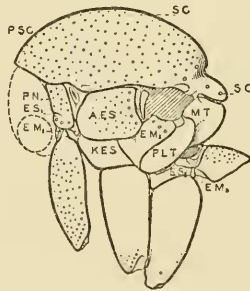
41. OPISTHOLOBA



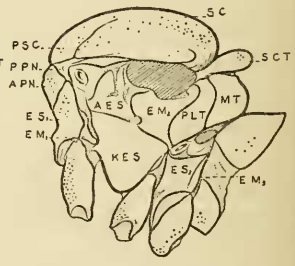
44 SCIARA



39 MYCETOPHILA



42. EPICYPTA



45. PSEUDOSCIARA

FIGS. 37-45.—Genera of the families Mycetophilidae and Sciaridae.

and the reduction of number of segments of the antennae. There is a difference in specialization between the males and females in regard to this aspect, since in general the females have fewer segments.

The remaining Mycetophilini are all characterized by the possession of mesepimeral setae. It would seem possible to subdivide further the genera studied, *Epicrypta*, *Mycetophila*, *Mycothera*, *Opistholoba*, and *Sceptonia*. In all but *Mycetophila* and *Mycothera* the mesepimeron shows a tendency to occupy somewhat of a horizontal position. This group of genera also shows a marked dorsoventral compression of the thorax.

Mycetophila and *Mycothera* are very closely related. Edwards, (1925) united *Mycothera* and *Opistholoba* with *Mycetophila*. In an earlier paper, Shaw (1948) indicated his reasons for regarding *Opistholoba* as a distinct genus. Though minor differences do exist in the thoracic sclerites of *Mycetophila* and *Mycothera*, it would be difficult to define such differences in a way to justify the separation of these two genera.

The genera *Opistholoba*, *Epicrypta*, and *Sceptonia* form a closely related group. Edwards (1925, p. 587) figured *Delopsis*, and this genus would seem to culminate the tendencies shown in this series. The modifications include—

1. A progressively increasing dorsoventral compression of the thorax.
2. The mesepimeron tends to become more nearly horizontal in position.
3. The prothorax pushes dorsally, thus forming a concave region in the lateral margin of the mesoscutum.

These genera can be separated on the basis of characteristics in the thoracic sclerites. Thus *Epicrypta* has the mesepimeron widened at the apex. In degree of dorsoventral compression, it is intermediate between *Opistholoba* and *Sceptonia*. Both *Sceptonia* and *Delopsis* have the anepisternite subrectangular in shape. *Sceptonia* lacks the expanded apex of the mesepimeron; moreover the mediotergite is quite pointed. The pronotum has pushed noticeably into the mesoscutum. The genus *Delopsis* seems to be the most highly specialized of the genera studied. The mesepimeron is greatly reduced; the pronotum extends deeply into the margin of the mesoscutum.

Subfamily MANOTINAE

Edwards (1925) recognized a separate subfamily for *Allactoneura* and *Manota*. As discussed elsewhere in this paper, *Allactoneura* appears to us much more closely related to the Cycloneurini of the Sciophilinae. However, *Allactoneura* does not agree with our con-

cepts of the Cycloneurini, and therefore we have erected a new tribe—Allactoneurini—for this genus.

A specimen of *Manota defecta* Williston was lent for examination. Since the specimen could not be boiled, it was impossible to make a detailed study. Sufficient details could be observed to substantiate the belief that a separate subfamily should be recognized. The prothoracic region is large, expanded, and somewhat shieldlike. No distinct suture could be seen between the prothoracic pleura and tergum. The katepisternum and epimeron of the mesothorax appears to be fused, thus forming a large single sclerite. The head is unlike that of other Mycetophilidae with which we are familiar. The maxillary palpi are wholly different from those of any other genus of Mycetophilidae.

Family SCIARIDAE

Two genera of the related family Sciaridae are included. There has been much discussion as to the systematic position of this group. Edwards (1925) indicated their similarity in appearance to *Tetragoneura* and *Docosia* (Leiini). He held that the Leiini and Sciarinae probably had common origin, but since some of the more primitive genera of sciarids maintain macrotrichia, he did not consider that this group evolved from *Tetragoneura* or its near relatives.

The similarities in venation between the two groups represent a case of parallel development of a characteristic by two separate groups. This phenomenon has been noted elsewhere by Crampton. It indicates the need for use of many characteristics rather than one or two in grouping genera.

Sciara (fig. 44), as indicated in an earlier paper (Shaw, 1948), is sufficiently distinct from the true Mycetophilidae on the basis of thoracic sclerites to warrant its being placed in a separate family.

Pseudosciara (fig. 45) was placed with the Mycetophilinae by Johannsen (1909), who states: "The form of the head and the course of media remind one of *Sciara*, but the long coxae and position of Cu show relationship of Mycetophilini." Edwards (1925) considered this genus to be allied to the Leiini (Mycetophilinae). In 1932 he placed the genus with the Sciarinae.

On the basis of thoracic sclerites it is evident that *Pseudosciara* is a true sciarid and that any similarities of this genus with the Mycetophilinae are more apparent than real. Both *Sciara* and *Pseudosciara* possess a distinct precoxal bridge, which is lacking in all the genera of the Mycetophilidae we have studied. The shape of the other

sclerites is similar in both genera, with *Pseudosciara* appearing more specialized. Both possess a midpleural pit.

SUMMARY

The pleural sclerites of 45 genera of fungus gnats are herein illustrated. A discussion of the relationships of these and certain other genera is presented.

On the basis of the structure of the thoracic pleura, the genus *Bolitophilella* is not considered as distinct from *Bolitophila*. The genus *Calliceratomyia*, placed in the Ceroplatinae by Lane, is considered to be more closely related to *Nervijuncta* and *Symmerus* (Ditomyiinae) than to the genera of the Ceroplatinae we have studied. The systematic position of *Centrocnemis* is somewhat uncertain at present. The genus *Apemon* appears to be intermediate between the Ditomyiinae and the Ceroplatinae. It is logical to include *Macrocera* and *Fenderomyia* in the Ceroplatinae. The genus *Paratinia* seems to be more closely allied to the Gnoristini than to the Sciophilini, where it had been placed by Edwards (1925). The genera *Parvicellula*, *Monoclona*, and *Mycomyia* are fairly closely related and are apparently intermediate between the Sciophilinae and the Mycetophilinae. Since *Cycloneura* and *Procylloneura* do not appear closely related to the other genera of the Leiini in which they were placed on the basis of wing venation, a new tribe—the Cycloneurini—is proposed for these two genera and probably for *Paracylloneura*. The genus *Allactoneura* is removed from the Manotinae and placed in a new tribe—the Allactoneurini. The affinities of *Lygistorhina* seem to be closest to certain of the Gnoristini, but we consider that a separate subfamily should be recognized for *Lygistorhina*. The genus *Mycothera* does not appear to be distinct from *Mycetophila*. However, *Opistholoba* seems to be sufficiently distinct to warrant its maintenance as a separate genus. The genus *Manota* is so different from the other genera that a separate subfamily should be recognized for it.

Two genera (*Sciara* and *Pseudosciara*) of the related family Sciaridae are figured. *Pseudosciara* has been variously grouped by earlier investigators, some of whom have placed the genus in the Mycetophilinae. The thoracic sclerites indicate that it should be included with the other Sciaridae.

CONCLUSIONS

As suggested in an earlier paper (Shaw, 1948), the shape of the pleural sclerites is of value as a means to indicate phylogenetic rela-

tionships of the Mycetophilidae. Future investigators would do well to include these structures in describing new genera and species.

ABBREVIATIONS USED ON FIGURES

- AES, Anepisternum of mesothorax.
 APN, Anterior pronotum.
 EM₁, Prothoracic epimeron.
 EM₂, Mesothoracic epimeron.
 EM₃, Metathoracic epimeron.
 ES₁, Prothoracic episternum.
 ES₂, Metathoracic episternum.
 KES, Katepisternum of mesothorax.
 MP, Midpleural pit.
 MT, Mediotergite.
 PLT, Pleurotergite.
 PPN, Posterior pronotum—pronotal scutellum.
 PSc, Prescutum of mesonotum.
 Sc, Scutum of mesonotum.
 ScT, Scutellum of mesonotum.

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